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(72) Inventors:
• **LV, Yangpeng**
Beijing, 100085 (CN)
• **PENG, Tao**
Beijing, 100085 (CN)

(74) Representative: **Hughes, Andrea Michelle**
Dehns Germany
Theresienstraße 6-8
80333 München (DE)

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(71) Applicant: **Beijing Xiaomi Mobile Software Co., Ltd.**
Beijing 100085 (CN)

(54) **METHOD AND APPARATUS FOR CONTROLLING DEVICES**

(57) The present disclosure provides a method and an apparatus for controlling a device. The method includes: displaying a control symbol corresponding to the controlled device in a lock screen; determining a control instruction corresponding to the control symbol, if a trig-

ger operation on the control symbol is detected; and sending the control instruction to the controlled device, in which the control instruction is used to instruct the controlled device to execute a predetermined operation corresponding to the control instruction.

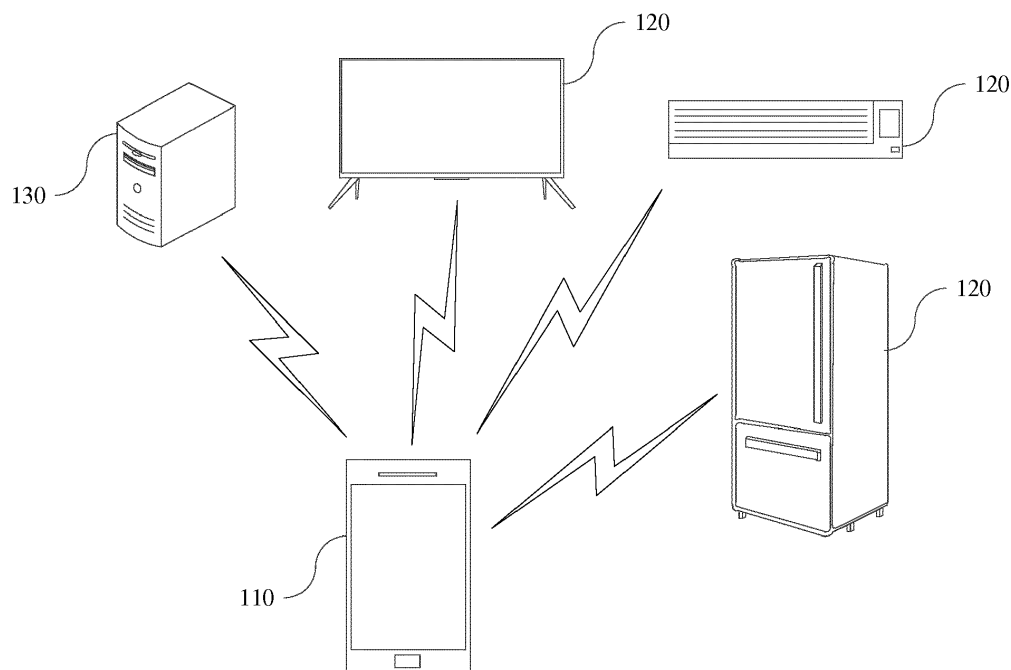


Fig. 1

Description**FIELD**

[0001] The present disclosure relates to a control technology field, and more particularly to a method and an apparatus for controlling a device.

BACKGROUND

[0002] In daily life, the mobile phone may be used as a main control device of some electronic devices, to control the electronic devices to perform related operations, for example, to control a TV to change channel or volume.

[0003] In the related art, when the mobile phone is in the lock screen state, the user needs to unlock the screen of the mobile phone if he wants to control other electronic devices to perform related operations via the mobile phone, and then open the application (APP) having the capability of controlling electronic devices in the mobile phone with unlocked screen, and control the electronic devices to execute related operations by using related control functions in the APP.

SUMMARY

[0004] Embodiments of the present disclosure provide a method and an apparatus for controlling a device. The technical solutions are as follows.

[0005] According to embodiments of a first aspect of the present disclosure, a method for controlling a device is provided, and the method includes:

displaying a control symbol corresponding to a controlled device in a lock screen;
determining a control instruction corresponding to the control symbol, if a trigger operation on the control symbol is detected; and
sending the control instruction to the controlled device, in which the control instruction is used to instruct the controlled device to execute a predetermined operation corresponding to the control instruction.

[0006] Displaying a control symbol corresponding to the controlled device in a lock screen may include:

displaying a device identification list in the lock screen, in which the device identification list includes an identification of the controlled device;
if a selection operation on the identification of the controlled device is detected, displaying a control panel of the controlled device at a specified position in the lock screen, in which the control panel contains the control symbol.

[0007] The method may further include:

obtaining a display attribute of the control symbol

before displaying the control symbol corresponding to the controlled device in the lock screen, in which the display attribute is used to indicate whether to display in the lock screen; and

displaying the control symbol corresponding to the controlled device in the lock screen, if the display attribute indicates displaying in the lock screen.

[0008] The method may further include:

displaying an attribute setting interface before obtaining the display attribute of the control symbol, in which the attribute setting interface contains setting options of the control symbol;

setting the display attribute of the control symbol according to setting operations on the setting options of the control symbol.

[0009] Determining a control instruction corresponding to the control symbol if a trigger operation on the control symbol is detected may include:

if the trigger operation on the control symbol is detected, capturing audio via an audio capture unit;
performing a speech recognition on the audio captured to obtain a speech text;
determining the control instruction corresponding to the speech text.

[0010] Determining the control symbol corresponding to the speech text may include:

sending a query request to a cloud server, the query request comprising the speech text; and
receiving the control instruction determined and returned by the cloud server according to the speech text.

[0011] According to embodiments of a second aspect of the present disclosure, an apparatus for controlling a device is provided, and the apparatus includes:

a control symbol display module, configured to display a control symbol corresponding to a controlled device in a lock screen;
an instruction determining module, configured to determine a control instruction corresponding to the control symbol, if a trigger operation on the control symbol is detected; and
a sending module, configured to send the control instruction to the controlled device, in which the control instruction is used to instruct the controlled device to execute a predetermined operation corresponding to the control instruction.

[0012] The control symbol display module may include:

a first display sub-module, configured to display a device identification list in the lock screen, in which the device identification list includes an identification of the controlled device; and
 a second display sub-module, configured to display a control panel of the controlled device at a specified position in the lock screen, if a selection operation on the identification of the controlled device is detected, in which the control panel contains the control symbol.

[0013] The apparatus may further include:

an attribute obtaining module, configured to obtain a display attribute of the control symbol before the control symbol display module displays the control symbol corresponding to the controlled device in the lock screen, in which the display attribute is used to indicate whether to display in the lock screen, the control symbol display module is configured to display the control symbol corresponding to the controlled device in the lock screen, if the display attribute indicates displaying in the lock screen.

[0014] The apparatus may further include:

an interface display module, configured to display an attribute setting interface before the display attribute of the control symbol is obtained, in which the attribute setting interface contains setting options of the control symbol;
 a setting module, configured to set the display attribute of the control symbol according to setting operations on the setting options of the control symbol.

[0015] The instruction determining module may include:

an audio capture sub-module, configured to capture audio via an audio capture unit, if the trigger operation on the control symbol is detected;
 a speech recognition sub-module, configured to perform a speech recognition on the audio captured to obtain a speech text;
 an instruction determining sub-module, configured to determine the control instruction corresponding to the speech text.

[0016] The instruction determining sub-module may include:

a sending unit, configured to send a query request to a cloud server, the query request comprising the speech text; and
 a receiving unit, configured to receive the control instruction determined and returned by the cloud server according to the speech text.

[0017] According to embodiments of a third aspect of the present disclosure, an apparatus for controlling a device is provided, and the apparatus includes:

a processor; and
 a memory, configured to store instructions executable by the processor,
 in which, the processor is configured to:

display a control symbol corresponding to a controlled device in a lock screen;
 determine a control instruction corresponding to the control symbol, if a trigger operation on the control symbol is detected; and
 send the control instruction to the controlled device, in which the control instruction is used to instruct the controlled device to execute a predetermined operation corresponding to the control instruction.

[0018] The technical solutions provided in the present disclosure may have the following beneficial effects.

[0019] With embodiments of the present disclosure, the control symbol corresponding to the controlled device is displayed in the lock screen, and if the trigger operation on the control symbol is detected, the control instruction corresponding to the control symbol is determined and sent to the controlled device, in which the control instruction is used to instruct the controlled device to execute the predetermined operation corresponding to the control instruction. In this way, the user may control the controlled device to execute related operations rapidly via the control symbol on the lock screen of a main control device, without unlocking the main control device and without entering into an application for controlling devices, thus simplifying the operation steps of controlling the controlled device via the main control device with locked screen.

[0020] It should be understood that the general description above and the following detailed description are merely exemplary and illustrative, and cannot be construed to limit the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments consistent with the invention and, together with the description, serve to explain the principles of the invention.

Fig. 1 is a schematic diagram showing an implementation environment in which a method for controlling a device according to the present disclosure is applied.

Fig. 2 is a flow chart of a method for controlling a device according to an exemplary embodiment.

Fig. 3 is a flow chart of a method for controlling a

device according to another exemplary embodiment. Fig. 4 is a schematic interface diagram of an attribute setting interface based on an embodiment shown in Fig. 3.

Fig. 5 is a schematic interface diagram of a device identification list display based on an embodiment shown in Fig. 3.

Fig. 6 is a schematic interface diagram of another device identification list display based on an embodiment shown in Fig. 3.

Fig. 7 is a schematic diagram of a lock screen based on an embodiment shown in Fig. 3.

Fig. 8 is a schematic diagram showing switching a control panel of a controlled device based on an embodiment shown in Fig. 3.

Fig. 9 is a flow chart of a method for controlling a device according to yet another exemplary embodiment.

Fig. 10 is a schematic interface diagram of an attribute setting interface based on an embodiment shown in Fig. 9.

Fig. 11 is a schematic interface diagram of displaying a speech control symbol based on an embodiment shown in Fig. 9.

Fig. 12 is a block diagram of an apparatus for controlling a device according to an exemplary embodiment.

Fig. 13 is a block diagram of an apparatus for controlling a device according to another exemplary embodiment.

Fig. 14 is a block diagram of another apparatus according to an exemplary embodiment.

DETAILED DESCRIPTION

[0022] In order to make objectives, technical solutions and advantages of the present disclosure clearer, exemplary embodiments will be described in detail herein with reference to accompanying drawings. Throughout figures referred by the following description, the same reference number in different figures indicates the same or similar elements unless otherwise stated. Implementations described in the following exemplary embodiments do not represent all the implementations consistent with the present disclosure. Instead, they are only examples of methods and devices consistent with some aspects of the present disclosure detailed in the appended claims.

[0023] Fig. 1 is a schematic diagram of an implementation environment in which a method for controlling a device according to the present disclosure is applied. The implementation environment may include a main control device 110, a controlled device 120 and a cloud server 130.

[0024] The main control device 110 is configured to send a control instruction to the controlled device 120. The main control device 110 is connected with the controlled device 120 via a wireless network. The wireless network may be a 2G, 3G or 4G network, or may be a

wireless local network. Moreover, the main control device 110 may be connected with the controlled device 120 via IrDA technology, UWB technology, Bluetooth technology or other technology.

[0025] The main control device 110 may be provided with a touch screen used for displaying information and receiving a touch operation from a user. The main control device 110 may be a terminal having a lock screen state, for example, a mobile phone, a tablet PC, a wearable device, a MP3 and a MP4.

[0026] The controlled device 120 is configured to receive the control instruction sent by the main control device, and to perform work indicated by the control instruction. The controlled device 120 may be a smart device or a device which may constitute a smart scene, for example, an air conditioner, a TV, a heater, an air cleaner, a water purifier, a lamp, a camera, a power switch, an infrared sensor, and a smart socket.

[0027] The implementation environment may further include the cloud server 130. The cloud server 130 is connected with the main control device 110 via the wireless network. The cloud server 130 may provide speech recognition services, and return the control instruction recognized to the main control device 110.

[0028] In the following, taking the implementation environment shown in Fig. 1 as an example, technical solutions provided by respective embodiments of the present disclosure will be explained and illustrated.

[0029] Fig. 2 is a flow chart of a method for controlling a device according to an exemplary embodiment. The method may be executed by the main control device 110 in the implementation environment shown in Fig. 1, and the method may include following steps.

[0030] In step 201, a control symbol corresponding to the controlled device is displayed in a lock screen.

[0031] In step 202, if a trigger operation on the control symbol is detected, the control instruction corresponding to the control symbol is determined.

[0032] In step 203, the control instruction is sent to the controlled device, in which the control instruction is used to instruct the controlled device to execute a predetermined operation corresponding to the control instruction.

[0033] In conclusion, with the method for controlling a device provided by embodiments of the present disclosure, the control symbol corresponding to the controlled device is displayed in the lock screen, and if the trigger operation on the control symbol is detected, the control instruction corresponding to the control symbol is determined and sent to the controlled device, in which the control instruction is used to instruct the controlled device to execute the predetermined operation corresponding to the control instruction. In this way, the user may control the controlled device to execute related operations rapidly via the control symbol on the lock screen of a main control device, without unlocking the main control device and without entering into an application for controlling devices, thus simplifying the operation steps of controlling the controlled device via the main control device with

locked screen.

[0034] Fig. 3 is a flow chart of a method for controlling a device according to another exemplary embodiment. The method may be executed by the main control device 110 in the implementation environment shown in Fig. 1, and may include following steps.

[0035] In step 301, an attribute setting interface is displayed, in which the attribute setting interface contains setting options of the control symbol.

[0036] The setting options may include display attribute setting options, and the user may pre-set whether to display the control symbol corresponding to the controlled device via the attribute setting option of the controlled device and pre-set displaying which control symbols corresponding to the controlled device. Alternatively, the setting options may further include a brightness attribute setting option and a color attribute setting option for setting the brightness and color of the control symbol displayed in the lock screen.

[0037] For example, reference may be made to Fig. 4, which is a schematic interface diagram of an attribute setting interface based on the embodiment shown in Fig. 3. For the setting item 401, the setting item 402 and the setting item 403 shown in the attribute setting interface 400, each setting item is configured to display the setting option of one first control symbol, and each first control symbol is corresponding to one controlled device. For the setting item 404, the setting item 405 and the setting item 406, each setting item is configured to display the setting option of one second control symbol, and each second control symbol is corresponding to one smart scene, in which when one smart scene is started and the working condition of a certain controlled device changes, other controlled devices related with the controlled device perform the predetermined operation.

[0038] In Fig. 4, the setting item corresponding to each control symbol has an attribute setting region. Taking the setting item 401 as an example, the attribute setting region corresponding to the setting item 401 is the attribute setting region 41. In the attribute setting region 41, attributes which can be set may include a display attribute setting option 41 a, a brightness attribute setting option 41b and a color attribute setting option 41c. The display attribute is the primary attribute of the setting item 401. When the display attribute of the setting item 401 is set as starting, the brightness attribute setting option 41b and the color attribute setting option 41 c are displayed in the attribute setting region 41. When the display attribute of the setting item 401 is set as hiding, the brightness attribute setting option 41b and the color attribute setting option 41c are not displayed in the attribute setting region 41. The brightness attribute setting option 41b is configured to indicate the brightness of the whole display screen when the control symbol is displayed in the lock screen, and the color attribute setting option 41c is configured to indicate the colors of the control symbol in the selected state and in the unselected state when the control symbol is displayed in the lock screen. For example,

the button indicating whether the TV (controlled device) is turned on or off is orange in the starting state and is grey white in the closing state. The color attribute setting option 41c may be displayed as an input box.

[0039] Besides the attributes 41a, 41b and 41c, the setting options of the setting item corresponding to the control symbol may further include an animation display attribute setting option, a period display attribute setting option and a smart display attribute setting option.

[0040] The animation display attribute setting option may include various animation forms of displaying the control symbol, for example, blinking, rotation, overturn and beating. The animation form is configured to indicate whether words displayed on the control symbol in the lock screen is displayed according to the predetermined animation display form. For example, the word "air conditioner" on the first control symbol is displayed in the animation form of blinking. The period display attribute setting option is configured to set the time period during which the control symbol is displayed in the lock screen when the display attribute of the control symbol is set as "starting". For example, the control symbol "air conditioner" is set to be displayed during 7:00~8:30 and 16:00~20:00. The smart display attribute setting option includes two states of starting and closing, and is configured such that the control symbol is displayed in the lock screen or not displayed in the lock screen according to how far the distance between the main control device and the controlled device is. For example, the first control symbol "TV" is not displayed when the distance between the main control device and the controlled device "TV" is greater than a predetermined threshold, and is displayed when the distance is less than the predetermined threshold.

[0041] In step 302, the display attribute of the control symbol is set according to setting operations on the setting options of the control symbol.

[0042] Taking the attribute setting interface shown in Fig. 4 as an example, in this step, the display attribute of the control symbol may be set according to the setting operations on the display attribute setting option, the brightness attribute setting option and the color attribute setting option of the control symbol, or according to the setting operations on the animation display attribute setting option, the period display attribute setting option, and the smart display attribute setting option of the control symbol.

[0043] In step 303, if the screen is unlocked, the display attribute of the control symbol is obtained, in which the display attribute is configured to indicate whether to display in the lock screen.

[0044] The display attribute of the control symbol includes two states of starting and hiding. The starting state is configured to indicate displaying the control symbol in the lock screen, and the hiding state is configured to indicate not displaying the control symbol in the lock screen. For example, as shown in Fig. 4, when the user sets the display attribute setting option of the TV as "on"

in the attribute setting interface, the display attribute of the control symbol corresponding to the TV is the starting state. In contrast, when the user sets the display attribute setting option of the TV as "off" in the attribute setting interface, the display attribute of the control symbol corresponding to the TV is the hiding state.

[0045] When the display attribute of the control symbol indicates displaying in the lock screen, steps 304 and 305 of displaying the control symbol in the lock screen are executed.

[0046] In step 304, when the display attribute indicates displaying in the lock screen, a device identification list is displayed in the lock screen, in which the device identification list contains an identification of the controlled device.

[0047] In one possible implementation, the device identification list is displayed in the lock screen in a form of tabs, and reference may be made to Fig. 5, which is a schematic interface diagram of displaying a device identification list based on the embodiment shown in Fig. 3. The device identification list is displayed in the lock screen in the form of tabs arranged in the horizontal direction, for example, disposed on the upper part 51 of the lock screen and on the middle-lower part 52 of the lock screen. The device identification list may also be displayed in the lock screen in the form of tabs arranged in the vertical direction, for example, disposed on the left part 53 of the lock screen and on the right part 54 of the lock screen.

[0048] Besides being displayed in the form of tabs as shown in Fig. 5, the device identification list may also be displayed in the form of scattered tags. Referring to Fig. 6, which is a schematic interface diagram of displaying another device identification list based on the embodiment shown in Fig. 3, respective device identifications in the device identification list are displayed at edges closely next to the periphery of the lock screen in the form of tags, for example, at the locations where the device identification 61, the device identification 62 and the device identification 63 are, as shown in Fig. 6. It should be noted that, the locations where the device identification 61, the device identification 62 and the device identification 63 are in Fig. 6 are merely possible locations of the device identifications, but not used to exclude other locations closely next to the periphery of the lock screen.

[0049] In step 305, when a selection operation on the identification of the controlled device is detected, a control panel of the controlled device is displayed at a specified location in the lock screen, in which the control panel includes the control symbol.

[0050] The selection operation on the identification of the controlled device may be clicking, dragging and pressing. When the clicking or dragging operation on the identification of the controlled device is detected, the control panel of the controlled device is displayed at the specified location in the lock screen. When it is determined that the clicking or dragging operation on the identification of the controlled device is detected, the control panel

of the controlled device may be displayed at the specified location with various animation effects. Alternatively, the pressing operation may be light pressing or heavy pressing. The control panel of the controlled device is displayed in a preview mode when the identification of the controlled device is lightly pressed. The lock screen quits the preview mode and recovers to the interface before the light pressing operation, when the operation on the identification of the controlled device switches to a touch-free state (no touch operation on the identification) from the light pressing state. The lock screen switches to the control panel of the controlled device displayed in the preview mode, when the operation on the identification of the controlled device switches to the heavy pressing state from the light pressing state. Under the heavy pressing state, the interface directly switches to the control panel of the controlled device for displaying.

[0051] In step 306, when the trigger operation on the control symbol is detected, the control instruction corresponding to the control symbol is determined.

[0052] When the main control device detects the trigger operation on the control symbol, the control instruction corresponding to the control symbol is determined at the main control device side according to the correspondence between the button clicked by the trigger operation and the control instruction.

[0053] Fig. 7 is a schematic diagram of a lock screen based on the embodiment shown in Fig. 3. As shown in Fig. 7, there are identifications 701, 702 and 703 of the controlled devices as well as the control panel 71 corresponding to the identification 701 of the controlled device in the lock screen 700, and the control panel 701 includes the switch button 71a, the first adjustment button 71b, the second adjustment button 71c, the first predetermined button 71d, the second predetermined button 71e and the third predetermined button 71f. When buttons 71a~71f in the control panel 71 are triggered by the user's operation, the main control device generates a single control instruction with respect to a certain controlled device. After the smart scene 71, the smart scene 72, the smart scene 73 are started by the trigger operation of the user, the device corresponding to the smart scene starts to work according to the predetermined working mode of the smart scene.

[0054] It should be noted that, the number of buttons displayed in the control panel is limited due to the size of the lock screen, and thus only buttons commonly used for controlling the controlled device are displayed, or one predetermined button is displayed and if this button is clicked, an interface including a plurality of other predetermined buttons is switched to, as shown in Fig. 8, which is a schematic diagram showing switching a control panel of the controlled device based on the embodiment shown in Fig. 3. In Fig. 8, when the selection operation on the function button 81 in the first control panel 800 of the controlled device is detected, the lock screen switches to the interface of displaying the second control panel 801. The second control panel of the controlled device

is set, such that buttons which cannot be placed in the first control panel due to the limited plane space can be placed.

[0055] When the situation in step 306 is satisfied, step 307 is executed.

[0056] In step 307, the control instruction is sent to the controlled device, in which the control instruction is configured to instruct the controlled device to execute the predetermined operation corresponding to the control instruction.

[0057] The main control device sends the control instruction to the controlled device, and the controlled device executes the predetermined operation in the control instruction after receiving the control instruction.

[0058] In one possible implementation, when the control symbol on which the trigger operation is performed on is the first control symbol for controlling a controlled device, the main control device may send the control instruction as follows, for controlling the controlled device to execute related operations. For example, after the control symbol of next channel in the control panel corresponding to the tag "TV" of the controlled device in the lock screen is clicked, the main control device obtains the control instruction according to the tag of the controlled device and the control symbol in the corresponding control panel. Then, the main control device sends the control instruction to the TV, and the TV changes to the next channel according to the control instruction after receiving the control instruction.

[0059] In another possible implementation, when the control symbol on which the trigger operation is performed is the second control symbol for controlling a smart scene, the main control device may send the control instruction as follows, for controlling the controlled device in the smart scene to execute related operations. For example, after the smart scene corresponding to the tag "go home mode" of the controlled device in the lock screen is started by clicking, the main control device generates a smart scene starting instruction. The smart scene starting instruction may be directly sent to respective smart devices in the smart scene, or may be sent to a control device for controlling the smart scene, which then sends the starting instruction to respective smart devices for instructing respective smart devices to work according to the working mode set for the smart scene, in which the control device for controlling the smart scene may be a home gateway, a router or a cloud server.

[0060] In conclusion, with the method for controlling the device provided by this embodiment, the display attributes of the control symbol are set by displaying the attribute setting interface, and then the display attributes of the control symbol are obtained, the device identification list containing the identification of the controlled device is displayed in the lock screen, the control panel (including the control symbol) of the controlled device is displayed at the specified location in the lock screen if the selection operation on the identification of the controlled device is detected, the control instruction corre-

sponding to the control symbol is determined if the trigger operation on the control symbol is detected, and the control instruction is sent to the controlled device for instructing the controlled device to execute the predetermined operation corresponding to the control instruction. In this way, the user may control the controlled device to execute related operations rapidly via the control symbol on the lock screen of the main control device, without unlocking the main control device and without entering into an application for controlling devices, thus simplifying the operation steps of controlling the controlled device via the main control device with locked screen.

[0061] Fig. 9 is a flow chart of a method for controlling a device according to yet another embodiment of the present disclosure. The method may be executed by the main control device 110 in the implementation environment shown in Fig. 1, and may include following steps.

[0062] In step 901, an attribute display interface is displayed, in which the attribute display interface includes setting options of the control symbol.

[0063] Fig. 10 is schematic interface diagram of an attribute display interface based on the embodiment shown in Fig. 9. As shown in Fig. 10, for the setting item 1001 shown in the attribute display interface 1000, the setting item 1001 is configured to set whether the display attribute 1001a of the speech control symbol is hiding or starting.

[0064] In step 902, the display attribute of the control symbol is set according to setting operations on the setting options of the control symbol.

[0065] Based on the example shown in step 901, in this step, the display attribute of the speech control symbol is determined as starting, or in this step, the display attribute of the speech control symbol is determined as closing.

[0066] In step 903, if it is detected that the screen is unlocked, the display attribute of the control symbol is obtained, in which the display attribute is configured to indicate whether to display the control symbol of the controlled device in the lock screen.

[0067] In step 904, if the display attribute indicates displaying in the lock screen, the control symbol of the controlled device is displayed in the lock screen.

[0068] Similar to the embodiment as shown in Fig. 3, in this step, the device identification list may be first displayed in the lock screen, the device identification list containing the identification of the controlled device, and then if the selection operation on the identification of the controlled device is detected, the control panel of the controlled device is displayed at the specified location in the lock screen, the control panel including the control symbol.

[0069] In step 905, if the trigger operation on the control symbol is detected, audio is captured via the audio capture unit.

[0070] Fig. 11 is a schematic interface diagram of displaying a speech control symbol based on the embodiment shown in Fig. 9. Referring to Fig. 11, in the interface

shown in Fig. 11, capturing audio via the audio capture unit is started if the speech control symbol 1101 is long-pressed or clicked. Alternatively, the audio capture unit is integrated in the main control device.

[0071] In step 906, speech recognition is performed on the audio captured, to obtain the speech text.

[0072] The main control device performs the speech recognition on the audio captured, to recognize the speech as the speech text, in which the speech text is language-related text information.

[0073] After step 906 is executed, step 907 and step 910 are executed, or steps 908 to 910 are executed.

[0074] In step 907, the control instruction corresponding to the speech text is determined.

[0075] The device executing step 907 is at the main control device side. The main control device searches for the control instruction corresponding to the speech text according to the correspondence table stored in local.

[0076] In step 908, a query request is sent to the cloud server, in which the query request includes the speech text.

[0077] In this step, the main control device sends the recognized speech text to the cloud server.

[0078] The cloud server is configured to query the control instruction corresponding to the speech text according to the correspondence table stored in server.

[0079] In step 909, the control instruction determined and returned by the cloud server according to the speech text is received.

[0080] The main control device receives the control instruction determined and returned by the cloud server according to the speech text.

[0081] Alternatively, the work executed by the cloud server in steps 908 and 909 may be done by the home gateway, the router, the LAN host or the workstation.

[0082] In step 910, the control instruction is sent to the controlled device, in which the control instruction is configured to instruct the controlled device to execute the predetermined operation corresponding to the control instruction.

[0083] The main control device sends the control instruction to the controlled device, and the controlled device executes the predetermined operation in the control instruction after receiving the control instruction.

[0084] In one possible implementation, when the control instruction obtained by the main control device is corresponding to controlling a controlled device, the main control device sends the control instruction as follows, for controlling the controlled device to execute related operations. For example, after the speech control symbol in the lock screen is triggered by clicking operation, the main control device receives the user's speech "turn on TV" and obtains the control instruction corresponding to the speech. Then, the main control device sends the control instruction to the TV, and the TV is turned on after the TV receives the control instruction.

[0085] In another possible implementation, when the

control instruction obtained by the main control device is corresponding to controlling a smart scene, the main control device sends the control instruction as follows, for controlling the control device in the smart scene to execute related operations. For example, after the speech control symbol in the lock screen is triggered by clicking operation, the main control device receives the user's speech "start go home mode" and receives the control instruction corresponding to the speech. Then, the main control device sends the starting instruction to the home gateway for starting the "go home mode", and then the home gateway sends the starting instruction to respective smart devices in the smart scene; or, the main control device directly sends the starting instruction to respective smart devices in the smart scene, for instructing respective smart devices to work according to the working mode set for the "go home mode".

[0086] In conclusion, with the method for controlling a device provided by this embodiment, the display attribute of the control symbol is set by displaying the attribute setting interface, and then the display attribute of the control symbol is obtained, the speech control symbol of the controlled device is displayed in the lock screen, the audio is captured via the audio capture unit if the trigger operation on the control symbol is detected, the speech text is obtained by performing the speech recognition on the audio captured, and the control instruction corresponding to the speech text is determined and sent to the controlled device, for instructing the controlled device to execute the predetermined operation corresponding to the control instruction. In this way, the user may control the controlled device to execute related operations rapidly via the control symbol on the lock screen of the main control device, without unlocking the main control device and without entering into an application for controlling devices, thus simplifying the operation steps of controlling the controlled device via the main control device with locked screen.

[0087] Fig. 12 is a block diagram of an apparatus for controlling a device according to an exemplary embodiment. The apparatus may be configured as a whole or a part of the main control device in the form of hardware circuits or a combination of hardware and software, and implement the method for controlling a device as shown in Fig. 2, 3 or 9. The apparatus may include a control symbol display module 1201, an instruction determining module 1202 and a sending module 1203.

[0088] The control symbol display module 1201 is configured to display a control symbol corresponding to the controlled device in a lock screen.

[0089] The instruction determining module 1202 is configured to determine a control instruction corresponding to the control symbol if a trigger operation on the control symbol is detected.

[0090] The sending module 1203 is configured to send the control instruction to the controlled device, in which the control instruction is configured to instruct the controlled device to execute a predetermined operation cor-

responding to the control instruction.

[0091] In conclusion, with the apparatus for controlling a device provided by embodiments of the present disclosure, the control symbol corresponding to the controlled device is displayed in the lock screen, and if the trigger operation on the control symbol is detected, the control instruction corresponding to the control symbol is determined and sent to the controlled device, in which the control instruction is used to instruct the controlled device to execute the predetermined operation corresponding to the control instruction. In this way, the user may control the controlled device to execute related operations rapidly via the control symbol on the lock screen of a main control device, without unlocking the main control device and without entering into an application for controlling devices, thus simplifying the operation steps of controlling the controlled device via the main control device with locked screen.

[0092] Fig. 13 is a block diagram of an apparatus for controlling a device according to another embodiment of the present disclosure. The apparatus may be a whole or a part of the main control device in the form of hardware circuits or a combination of hardware and software, and implement the method for controlling a device as shown in Fig. 2, 3 or 9. The apparatus may include a control symbol display module 1301, an instruction determining module 1302, a sending module 1303, an attribute obtaining module 1304, an interface display module 1305 and a setting module 1306.

[0093] The control symbol display module 1301 is configured to display a control symbol corresponding to the controlled device in a lock screen.

[0094] The instruction determining module 1302 is configured to determine a control instruction corresponding to the control symbol if a trigger operation on the control symbol is detected.

[0095] The sending module 1303 is configured to send the control instruction to the controlled device, in which the control instruction is configured to instruct the controlled device to execute a predetermined operation corresponding to the control instruction.

[0096] The control symbol display module 1301 includes a first display sub-module 1301a and a second display sub-module 1301b.

[0097] The first display sub-module 1301a is configured to display a device identification list in the lock screen, in which the device identification list contains an identification of the controlled device.

[0098] The second display sub-module 1301b is configured to display a control panel of the controlled device at a specified position in the lock screen, if a selection operation on the identification of the controlled device is detected, in which the control panel contains the control symbol.

[0099] The attribute obtaining module 1304 is configured to obtain a display attribute of the control symbol before the control symbol display module 1301 displays the control symbol corresponding to the controlled device

in the lock screen, in which the display attribute is used to indicate whether to display in the lock screen.

[0100] The control symbol display module 1301 is configured to display the control symbol corresponding to the controlled device in the lock screen, if the display attribute indicates displaying in the lock screen.

[0101] The interface display module 1305 is configured to display an attribute setting interface before the display attribute of the control symbol is obtained, in which the attribute setting interface contains setting options of the control symbol.

[0102] The setting module 1306 is configured to set the display attribute of the control symbol according to setting operations on the setting options of the control symbol.

[0103] The instruction determining module 1302 includes an audio capture sub-module 1302a, a speech recognition sub-module 1302b and an instruction determining sub-module 1302c.

[0104] The audio capture sub-module 1302a is configured to capture audio via an audio capture unit, if the trigger operation on the control symbol is detected.

[0105] The speech recognition sub-module 1302b is configured to perform a speech recognition on the audio captured to obtain a speech text.

[0106] The instruction determining sub-module 1302c is configured to determine the control instruction corresponding to the speech text.

[0107] The instruction determining sub-module 1302c further includes a sending unit 1302c1 and a receiving unit 1302c2.

[0108] The sending unit 1302c1 is configured to send a query request to a cloud server, the query request including the speech text.

[0109] The receiving unit 1302c2 is configured to receive the control instruction determined and returned by the cloud server according to the speech text.

[0110] In conclusion, with the apparatus for controlling a device provided by embodiments of the present disclosure, the control symbol corresponding to the controlled device is displayed in the lock screen, and if the trigger operation on the control symbol is detected, the control instruction corresponding to the control symbol is determined and sent to the controlled device, in which the control instruction is used to instruct the controlled device to execute the predetermined operation corresponding to the control instruction. In this way, the user may rapidly control the controlled device to execute related operations via the control symbol on the lock screen of a main control device, without unlocking the main control device and without entering into an application for controlling devices, thus simplifying the operation steps of controlling the controlled device via the main control device with locked screen.

[0111] The present disclosure further provides an apparatus for controlling a device, which includes a processor and a memory configured to store instructions executable by the processor. The processor is configured

to:

display a control symbol corresponding to a controlled device in a lock screen;
determine a control instruction corresponding to the control symbol, if a trigger operation on the control symbol is detected; and
send the control instruction to the controlled device, in which the control instruction is used to instruct the controlled device to execute a predetermined operation corresponding to the control instruction.

[0112] Displaying a control symbol corresponding to the controlled device in a lock screen may include:

displaying a device identification list in the lock screen, in which the device identification list includes an identification of the controlled device;
if a selection operation on the identification of the controlled device is detected, displaying a control panel of the controlled device at a specified position in the lock screen, in which the control panel contains the control symbol.

[0113] The method may further include:

obtaining a display attribute of the control symbol before displaying the control symbol corresponding to the controlled device in the lock screen, in which the display attribute is used to indicate whether to display in the lock screen; and
displaying the control symbol corresponding to the controlled device in the lock screen, if the display attribute indicates displaying in the lock screen.

[0114] The method may further include:

displaying an attribute setting interface before obtaining the display attribute of the control symbol, in which the attribute setting interface contains setting options of the control symbol;
setting the display attribute of the control symbol according to setting operations on the setting options of the control symbol.

[0115] Determining a control instruction corresponding to the control symbol if a trigger operation on the control symbol is detected may include:

if the trigger operation on the control symbol is detected, capturing audio via an audio capture unit;
performing a speech recognition on the audio captured to obtain a speech text;
determining the control instruction corresponding to the speech text.

[0116] Determining the control symbol corresponding to the speech text may include:

sending a query request to a cloud server, the query request comprising the speech text; and
receiving the control instruction determined and returned by the cloud server according to the speech text.

[0117] It should be noted that, for the sake of clarity, the apparatus provided by above embodiments are divided into respective function modules for implementing the functions of the apparatus. In practice use, the above functions may be allocated to different function modules according to actual demands, that is, the content structure of the apparatus is divided into respective function modules, for implementing all or a part of functions described above.

[0118] With respect to the apparatus in above embodiments, the specific implementations of respective modules have already been described in embodiments regarding methods, which will not be elaborated herein.

[0119] Fig. 14 is a block diagram of a device 1400 according to an exemplary embodiment. For example, the device 1400 may be a controlled device, for example, a smart phone, a wearable device, a smart TV and a vehicle terminal.

[0120] Referring to Fig. 14, the device 1400 may include the following one or more components: a processing component 1402, a memory 1404, a power component 1406, a multimedia component 1408, an audio component 1410, an Input/Output (I/O) interface 1412, a sensor component 1414, and a communication component 1416.

[0121] The processing component 1402 typically controls overall operations of the device 1400, such as the operations associated with display, telephone calls, data communications, camera operations, and recording operations. The processing component 1402 may include one or more processors 1420 to execute instructions to perform all or part of the steps in the above described methods. Moreover, the processing component 1402 may include one or more modules which facilitate the interaction between the processing component 1402 and other components. For instance, the processing component 1402 may include a multimedia module to facilitate the interaction between the multimedia component 808 and the processing component 1402.

[0122] The memory 1404 is configured to store various types of data to support the operation of the device 1400. Examples of such data include instructions for any applications or methods operated on the device 1400, contact data, phonebook data, messages, pictures, video, etc. The memory 1404 may be implemented using any type of volatile or non-volatile memory devices, or a combination thereof, such as a static random access memory (SRAM), an electrically erasable programmable read-only memory (EEPROM), an erasable programmable read-only memory (EPROM), a programmable read-only memory (PROM), a read-only memory (ROM), a magnetic memory, a flash memory, a magnetic or optical disk.

[0123] The power component 1406 provides power to various components of the device 1400. The power component 1406 may include a power management system, one or more power sources, and any other components associated with the generation, management, and distribution of power in the device 1400.

[0124] The multimedia component 1408 includes a screen providing an output interface between the device 1400 and the user. In some embodiments, the screen may include a liquid crystal display (LCD) and a touch panel (TP). If the screen includes the touch panel, the screen may be implemented as a touch screen to receive input signals from the user. The touch panel includes one or more touch sensors to sense touches, swipes, and other gestures on the touch panel. The touch sensors may not only sense a boundary of a touch or swipe action, but also sense a duration time and a pressure associated with the touch or swipe action. In some embodiments, the multimedia component 1408 includes a front camera and/or a rear camera. The front camera and the rear camera may receive external multimedia data while the device 1400 is in an operation mode, such as a photographing mode or a video mode. Each of the front camera and the rear camera may be a fixed optical lens system or have focus and optical zoom capability.

[0125] The audio component 1410 is configured to output and/or input audio signals. For example, the audio component 1410 includes a microphone (MIC) configured to receive an external audio signal when the device 1400 is in an operation mode, such as a call mode, a recording mode, and a voice recognition mode. The received audio signal may be further stored in the memory 1404 or transmitted via the communication component 1416. In some embodiments, the audio component 1410 further includes a speaker to output audio signals.

[0126] The I/O interface 1412 provides an interface for the processing component 1402 and peripheral interface modules, such as a keyboard, a click wheel, buttons, and the like. The buttons may include, but are not limited to, a home button, a volume button, a starting button, and a locking button.

[0127] The sensor component 1414 includes one or more sensors to provide status assessments of various aspects of the device 1400. For instance, the sensor component 1414 may detect an open/closed status of the device 1400 and relative positioning of components (e.g., the display and the keypad of the device 1400). The sensor component 1414 may also detect a change in position of the device 1400 or of a component in the device 1400, a presence or absence of user contact with the device 1400, an orientation or an acceleration/deceleration of the device 1400, and a change in temperature of the device 1400. The sensor component 1414 may include a proximity sensor configured to detect the presence of nearby objects without any physical contact. The sensor component 1414 may also include a light sensor, such as a CMOS or CCD image sensor, for use in imaging applications. In some embodiments, the sensor compo-

nent 1414 may also include an accelerometer sensor, a gyroscope sensor, a magnetic sensor, a pressure sensor, or a temperature sensor.

[0128] The communication component 1416 is configured to facilitate wired or wireless communication between the device 1400 and other devices. The device 1400 can access a wireless network based on a communication standard, such as WIFI, 2G, or 3G, or a combination thereof. In one exemplary embodiment, the communication component 816 receives a broadcast signal or broadcast associated information from an external broadcast management system via a broadcast channel. In one exemplary embodiment, the communication component 816 further includes a near field communication (NFC) module to facilitate short-range communications. For example, the NFC module may be implemented based on a radio frequency identification (RFID) technology, an infrared data association (IrDA) technology, an ultra-wideband (UWB) technology, a Bluetooth (BT) technology, and other technologies.

[0129] In exemplary embodiments, the device 1400 may be implemented with one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), controllers, micro-controllers, microprocessors, or other electronic components, for performing the above described methods.

[0130] In exemplary embodiments, there is also provided a non-transitory computer readable storage medium including instructions, such as the memory 1404 including instructions. The above instructions are executable by the processor 1420 in the device 1400, for performing the above-described methods. For example, the non-transitory computer-readable storage medium may be a ROM, a RAM, a CD-ROM, a magnetic tape, a floppy disc, an optical data storage device, and the like.

[0131] The present disclosure also provides a non-transitory computer readable storage medium including instructions that, when executed by the processor of the device 1400, cause the device 1400 to execute the above method for controlling a device.

[0132] Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed here. This application is intended to cover any variations, uses, or adaptations of the invention following the general principles thereof and including such departures from the present disclosure as come within known or customary practice in the art within the scope of the claims.

Claims

1. A method for controlling a device, comprising:

displaying a control symbol corresponding to a controlled device in a lock screen (201);

- determining a control instruction corresponding to the control symbol, if a trigger operation on the control symbol is detected (202; 306; 907); and
 sending the control instruction to the controlled device, wherein the control instruction is used to instruct the controlled device to execute a pre-determined operation corresponding to the control instruction (203; 307; 910).
2. The method according to claim 1, wherein displaying a control symbol corresponding to the controlled device in a lock screen comprises:
- displaying a device identification list in the lock screen, in which the device identification list comprises an identification of the controlled device (304; 904); and
 if a selection operation on the identification of the controlled device is detected, displaying a control panel of the controlled device at a specified position in the lock screen, in which the control panel contains the control symbol (305).
3. The method according to claim 1, further comprising:
- obtaining a display attribute of the control symbol before displaying the control symbol corresponding to the controlled device in the lock screen, wherein the display attribute is used to indicate whether to display in the lock screen (303; 903); and
 displaying the control symbol corresponding to the controlled device in the lock screen, if the display attribute indicates displaying in the lock screen (303; 304).
4. The method according to claim 3, further comprising:
- displaying an attribute setting interface before obtaining the display attribute of the control symbol, wherein the attribute setting interface contains setting options of the control symbol (301; 901); and
 setting the display attribute of the control symbol according to setting operations on the setting options of the control symbol (302; 902).
5. The method according to any preceeding claim, wherein, determining a control instruction corresponding to the control symbol if a trigger operation on the control symbol is detected comprises:
- if the trigger operation on the control symbol is detected, capturing audio via an audio capture unit (905);
 performing a speech recognition on the audio captured to obtain a speech text (906); and
 determining the control instruction corresponding to the speech text (907).
6. The method according to claim 5, wherein, determining the control symbol corresponding to the speech text comprises:
- sending a query request to a cloud server, the query request comprising the speech text (908); and
 receiving the control instruction determined and returned by the cloud server according to the speech text (909).
7. An apparatus for controlling a device, comprising:
- a control symbol display module (1201), configured to display a control symbol corresponding to a controlled device in a lock screen;
 an instruction determining module (1202), configured to determine a control instruction corresponding to the control symbol, if a trigger operation on the control symbol is detected; and
 a sending module (1203), configured to send the control instruction to the controlled device, wherein the control instruction is used to instruct the controlled device to execute a predetermined operation corresponding to the control instruction.
8. The apparatus according to claim 7, wherein the control symbol display module (1201) comprises:
- a first display sub-module (1301a), configured to display a device identification list in the lock screen, in which the device identification list comprises an identification of the controlled device; and
 a second display sub-module (1301b), configured to display a control panel of the controlled device at a specified position in the lock screen, if a selection operation on the identification of the controlled device is detected, in which the control panel contains the control symbol.
9. The apparatus according to claim 7 or 8, further comprising:
- an attribute obtaining module (1304), configured to obtain a display attribute of the control symbol before the control symbol display module displays the control symbol corresponding to the controlled device in the lock screen, wherein the display attribute is used to indicate whether to display in the lock screen,
 wherein the control symbol display module (1201) is configured to display the control symbol corresponding to the controlled device in the

lock screen, if the display attribute indicates displaying in the lock screen.

10. The apparatus according to claim 9, further comprising:

an interface display module (1305), configured to display an attribute setting interface before the display attribute of the control symbol is obtained, wherein the attribute setting interface contains setting options of the control symbol; and
a setting module (1306), configured to set the display attribute of the control symbol according to setting operations on the setting options of the control symbol.

11. The apparatus according to claim 7, wherein the instruction determining module (1202) comprises:

an audio capture sub-module (1302a), configured to capture audio via an audio capture unit, if the trigger operation on the control symbol is detected;
a speech recognition sub-module (1302b), configured to perform a speech recognition on the audio captured to obtain a speech text; and
an instruction determining sub-module (1302c), configured to determine the control instruction corresponding to the speech text.

12. The apparatus according to claim 11, wherein the instruction determining sub-module (1302c) comprises:

a sending unit (1302c1), configured to send a query request to a cloud server, the query request comprising the speech text; and
a receiving unit (1302c2), configured to receive the control instruction determined and returned by the cloud server according to the speech text.

13. An apparatus (1400) for controlling a device, comprising:

a processor (1420); and
a memory (1404), configured to store instructions executable by the processor,

wherein the processor (1420) is configured to:

display a control symbol corresponding to a controlled device in a lock screen (201);
determine a control instruction corresponding to the control symbol, if a trigger operation on the control symbol is detected (202; 306; 907); and
send the control instruction to the controlled device, in which the control instruction is used to

instruct the controlled device to execute a pre-determined operation corresponding to the control instruction (203; 307; 910).

14. A non-transitory computer readable storage medium, having stored therein instructions that, when executed by a processor, configured to execute a method in any one of claims 1 to 6.

15. A computer program, which when executing on a processor, performs a method according to any one of claims 1 to 6.

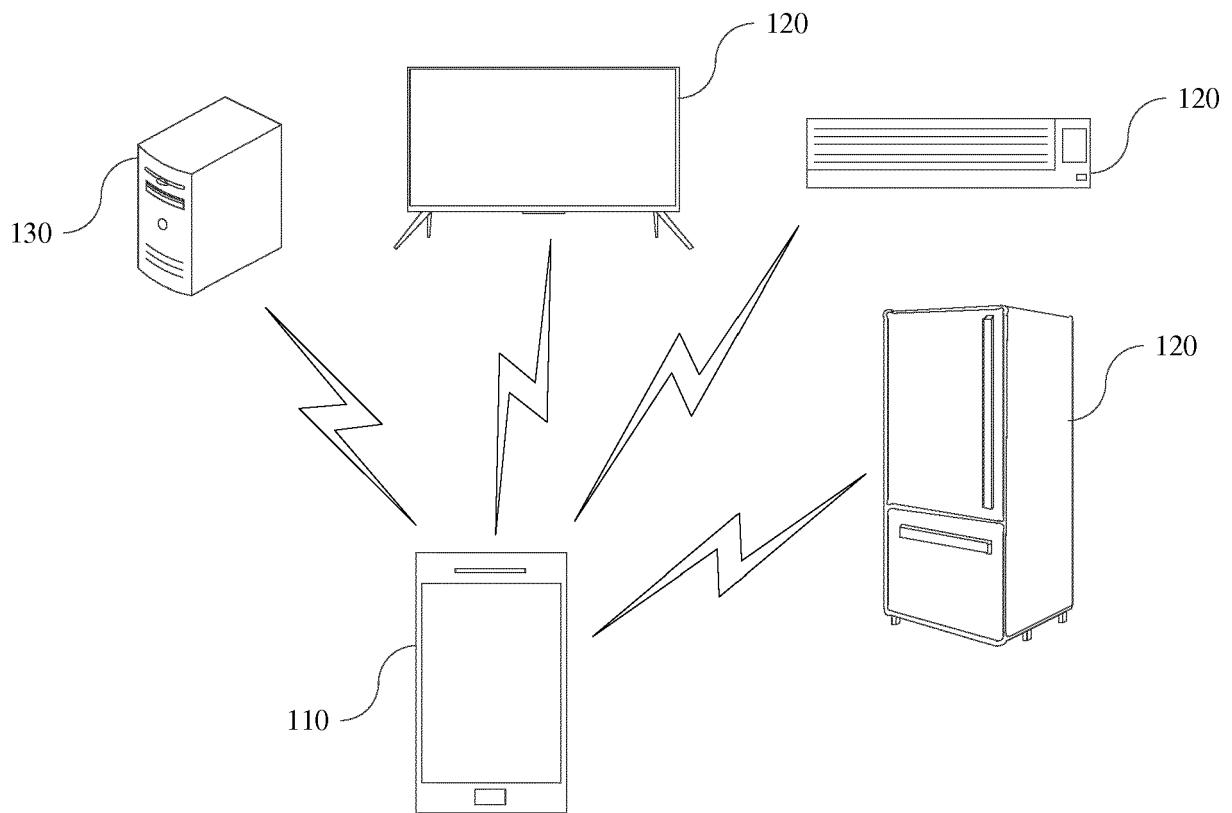


Fig. 1

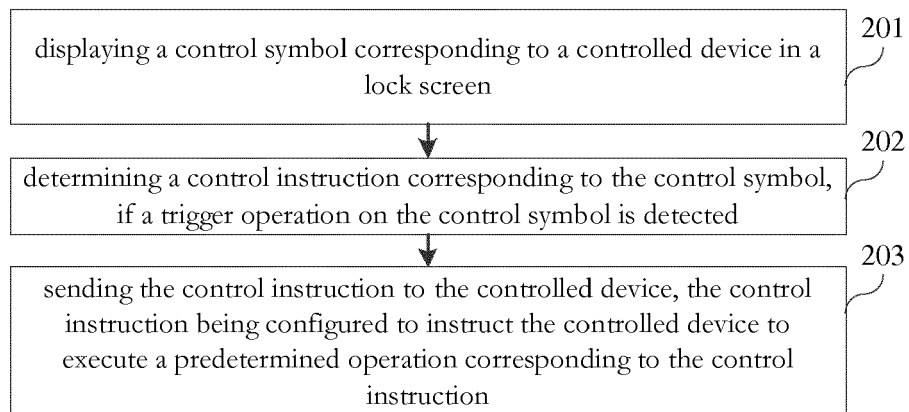


Fig.2

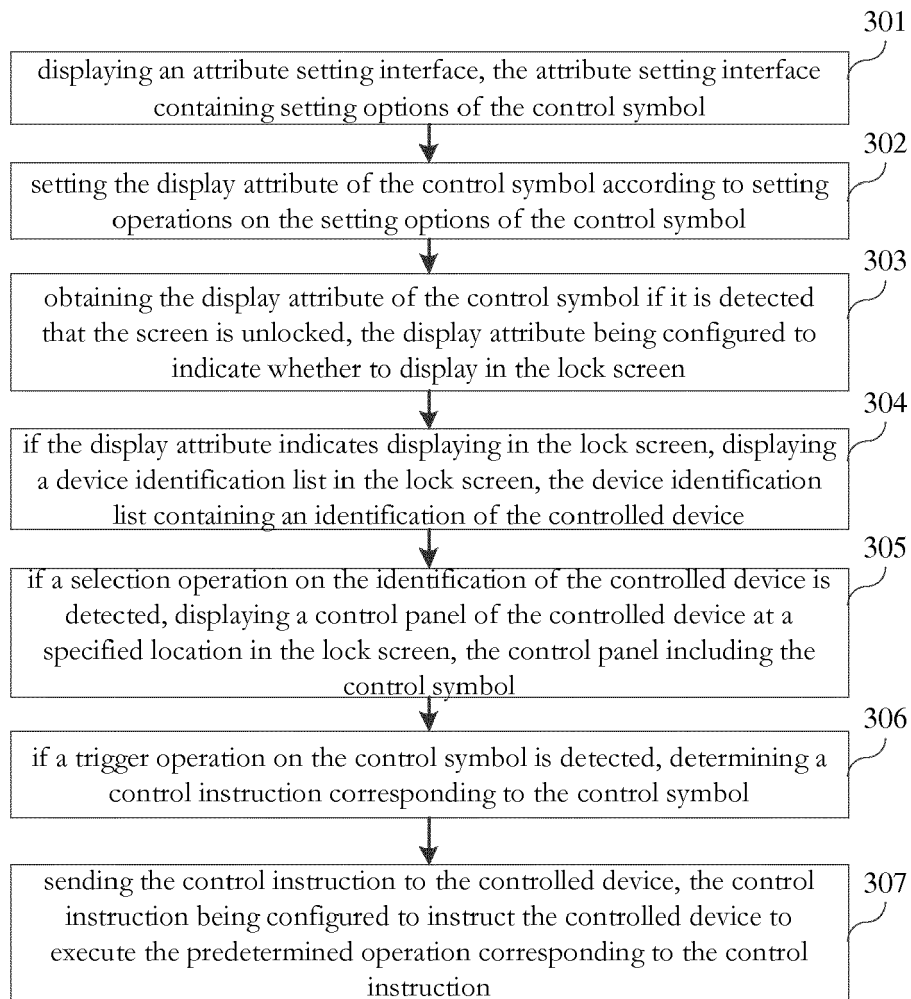


Fig. 3

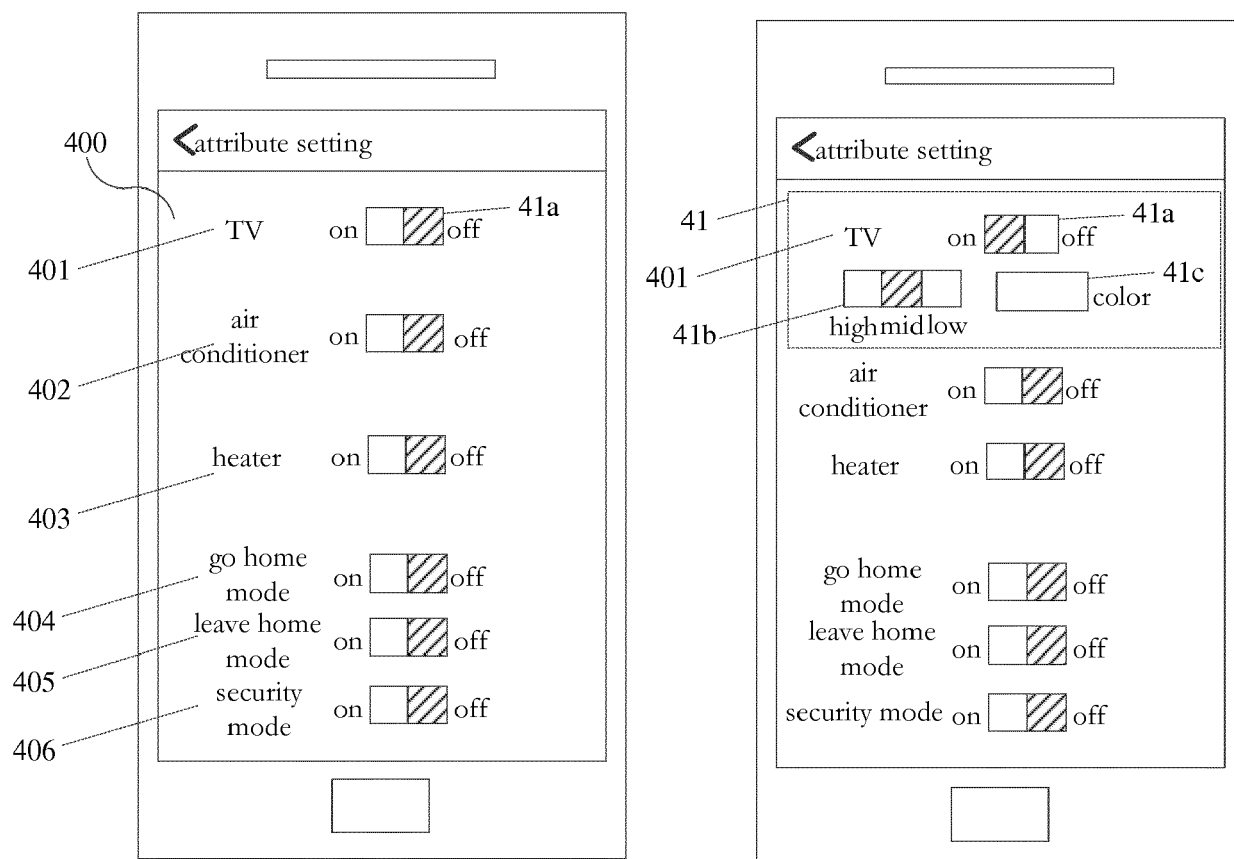


Fig. 4

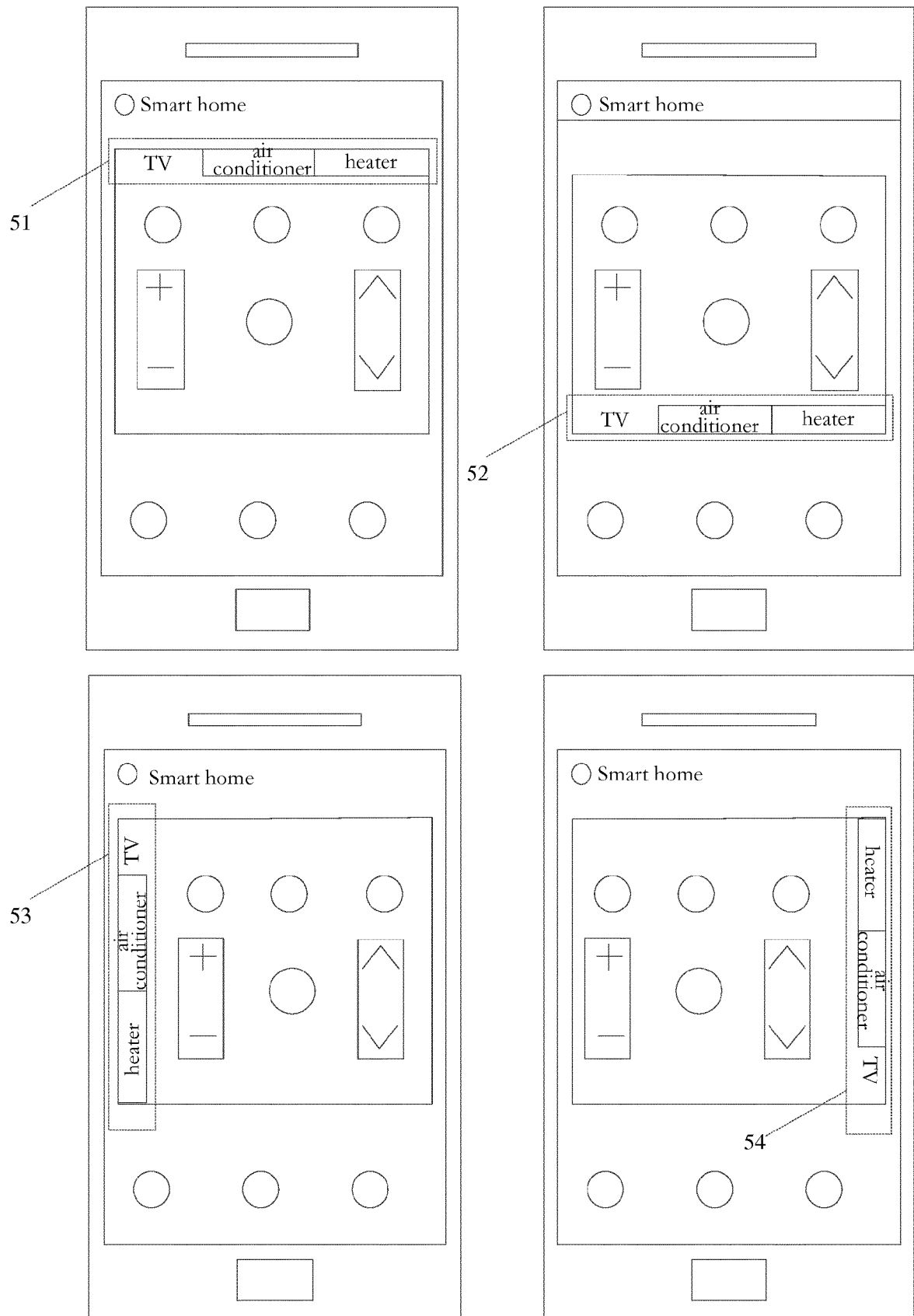


Fig. 5

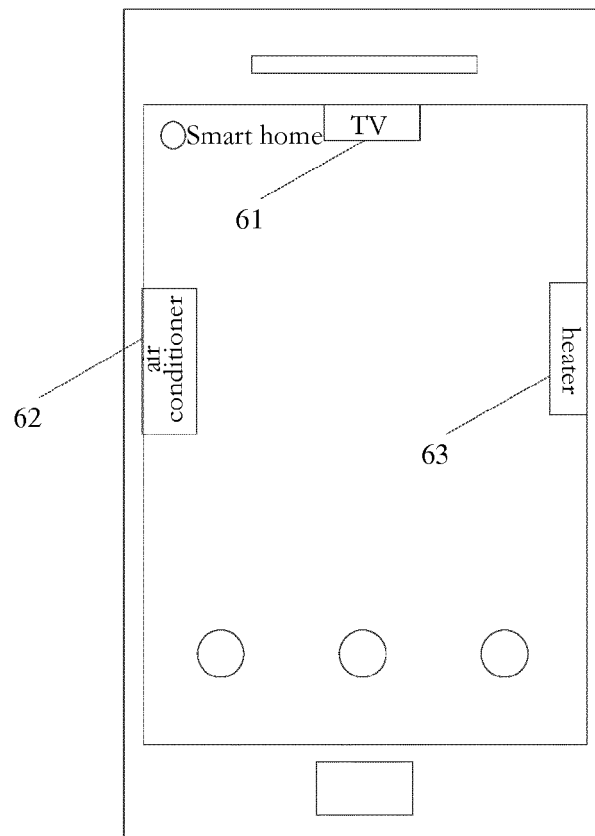


Fig. 6

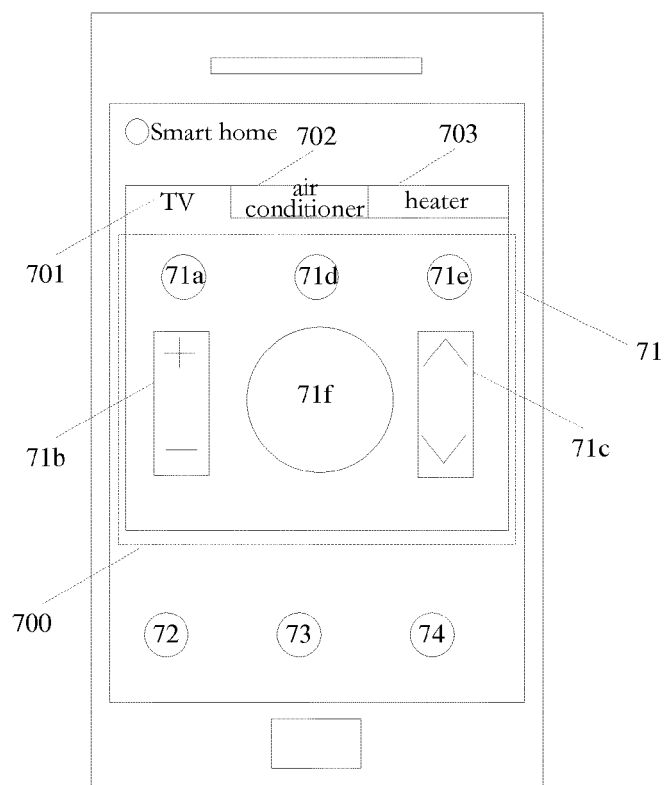


Fig. 7

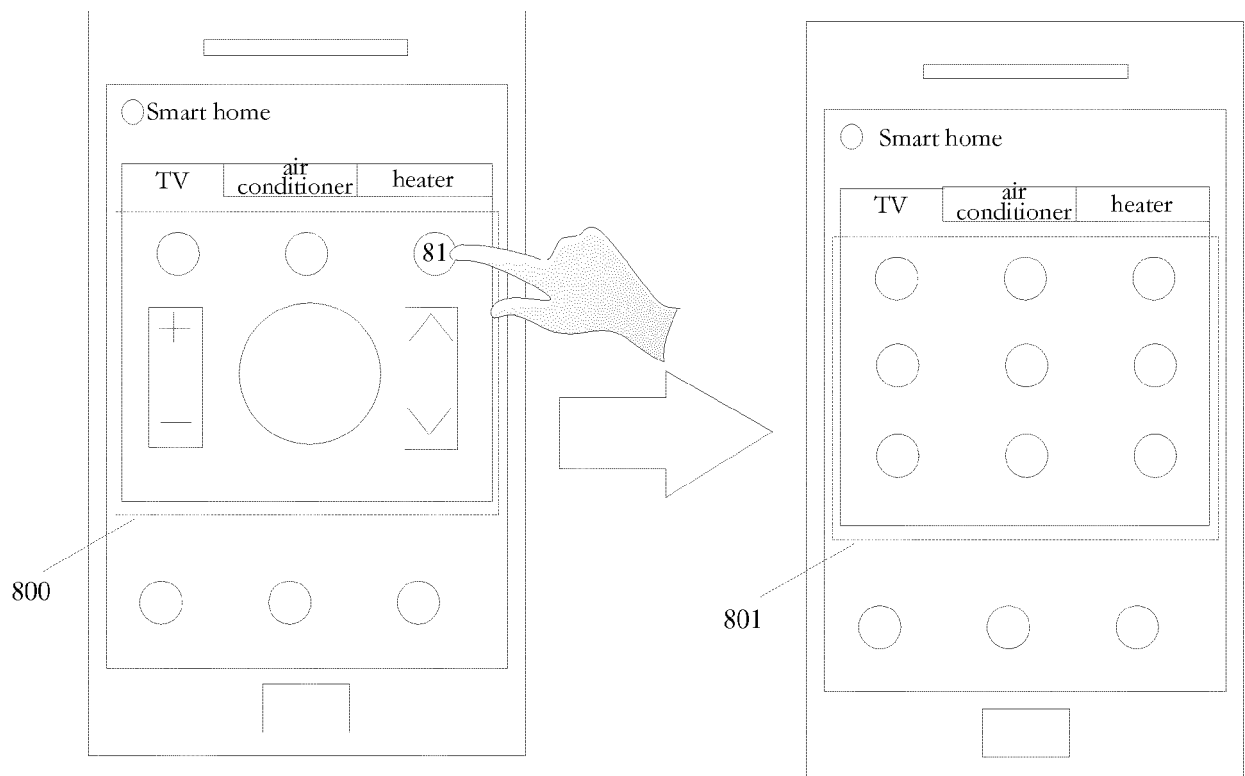


Fig. 8

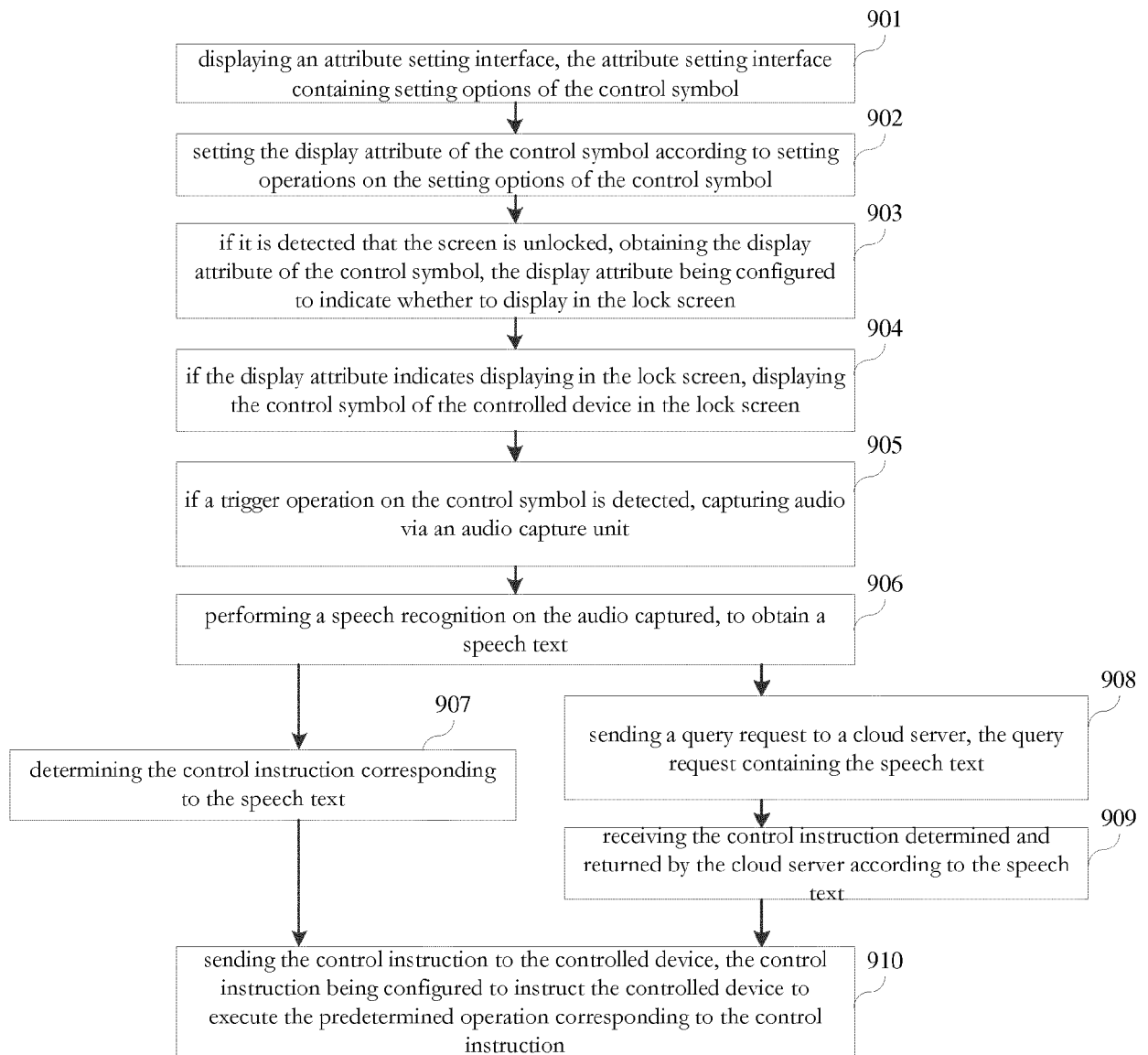


Fig. 9

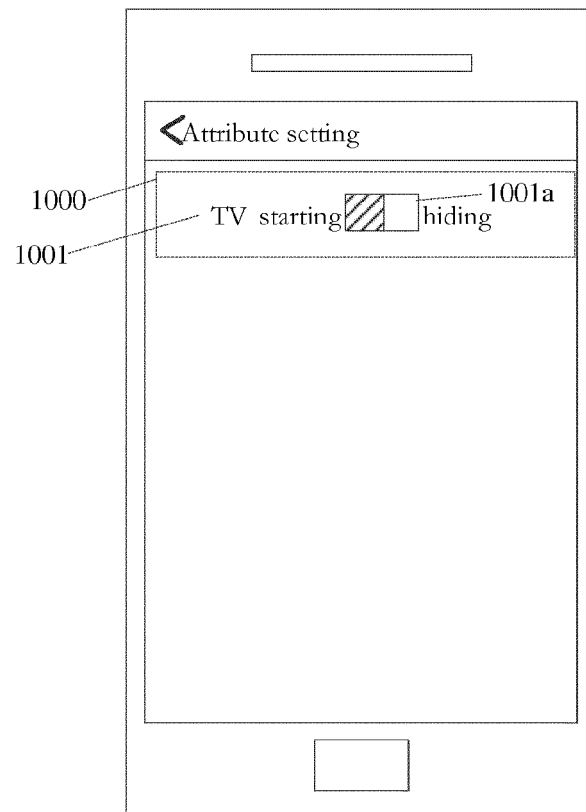


Fig. 10

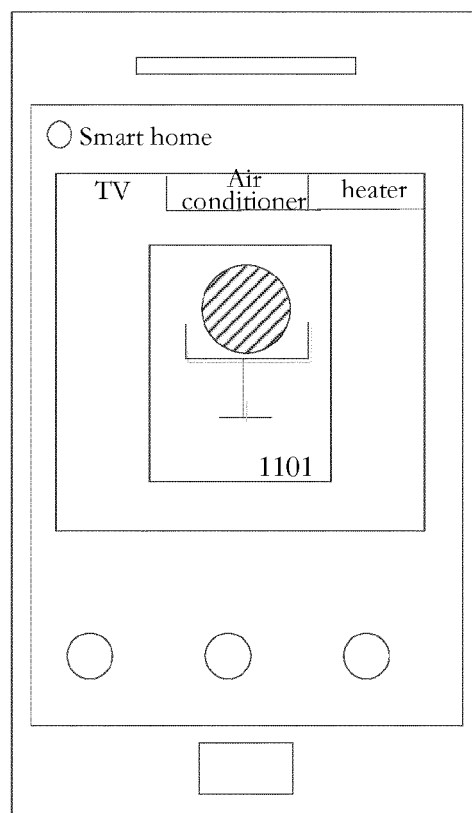


Fig. 11

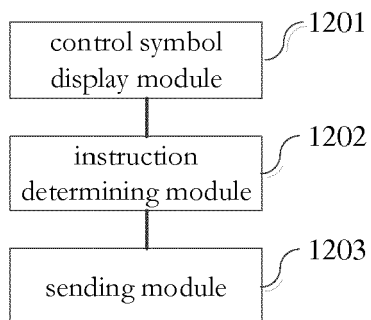


Fig. 12

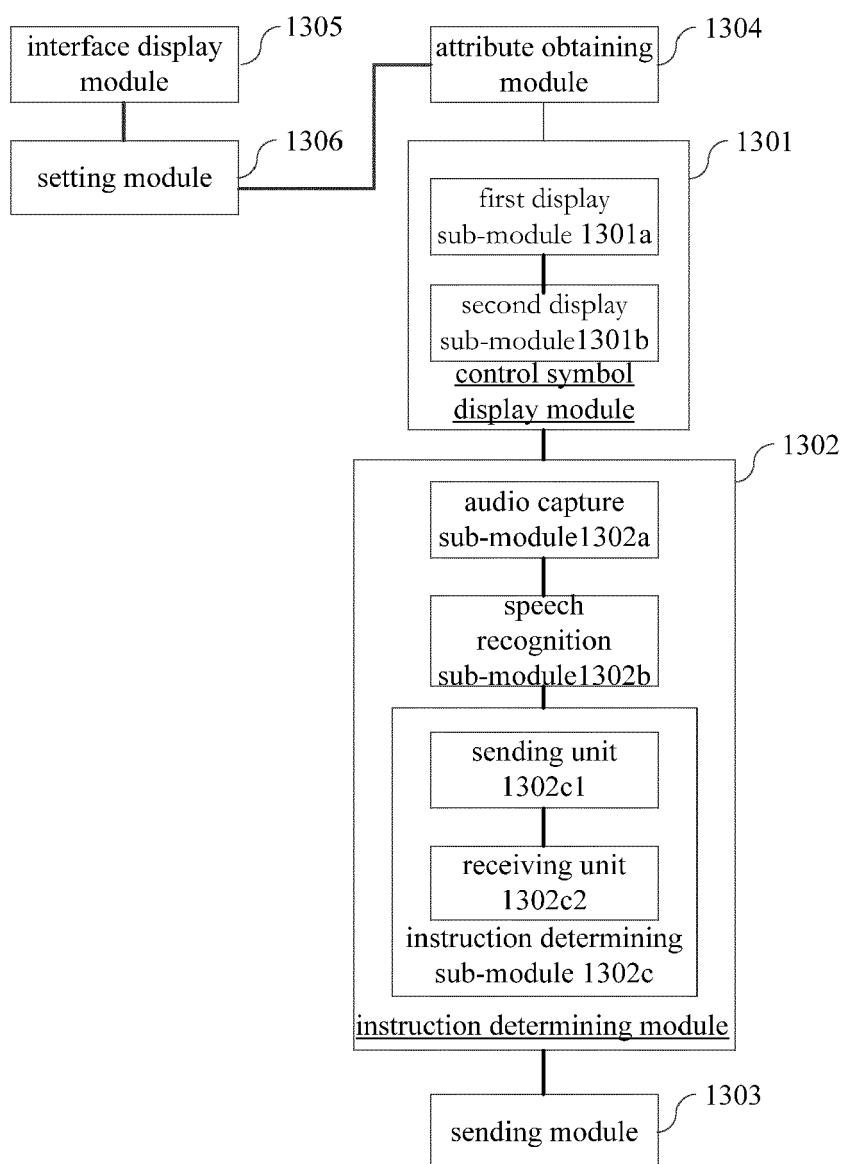


Fig. 13

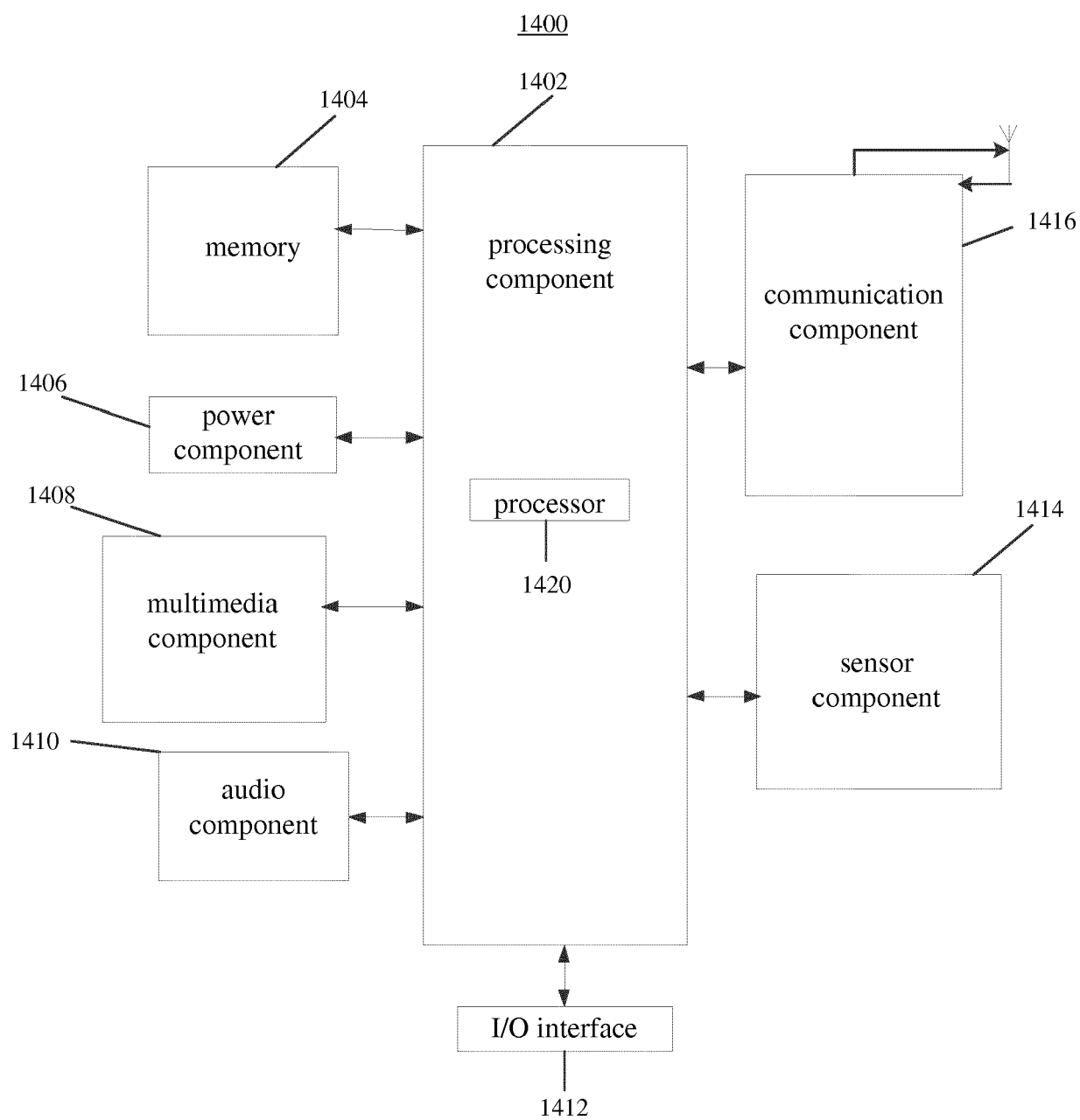


Fig. 14



EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 May 2017	Examiner de Biolley, Luc
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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The members are as contained in the European Patent Office EDP file on
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